

Claims

What is claimed is:

- 5           1. An apparatus for a reciprocating screw injection molding machinery having a barrel and a screw which rotates in the barrel comprising:
- a check valve having means to selectively switch to a first mode which allows bi-directional flow of material along the
- 10   screw.
2. The apparatus according to claim 1 further comprising:
- means for switching the check valve between the first mode and a second mode which prevents bi-directional flow of material
- 15   along the screw.
3. The apparatus according to claim 1 further comprising:
- means for switching the check valve between the first and second modes by axial motion of the screw.
- 20           4. The apparatus according to claim 1 further comprising:
- means for switching the check valve between the first and second modes by rotational motion of the screw.
- 25           5. The apparatus according to claim 1 further comprising:
- means for at least partially blocking the egress of the material from the barrel.
6. The apparatus according to claim 1 wherein the material
- 30   comprises:
- a cleaning compound.

7. The apparatus according to claim 6 wherein the cleaning compound comprises an abrasive.

8. The apparatus according to claim 6 wherein the cleaning  
5 compound comprises a detergent.

9. The apparatus according to claim 6 wherein the cleaning compound comprises materials which cause the cleaning compound to have a rheopectic flow behavior.

10

10. The apparatus according to claim 6 wherein the cleaning compound comprises materials which cause the viscosity of the cleaning compound to decrease during agitation.

11. The apparatus according to claim 6 wherein the cleaning  
15 compound comprises materials which release carbon dioxide when heated or agitated.

12. The apparatus according to claim 6 wherein the cleaning  
20 compound comprises materials which release water when heated or agitated.

13. The apparatus according to claim 6 wherein the cleaning  
25 compound comprises particles for polishing the barrel and the screw.

14. The apparatus according to claim 1 further comprising:  
means for attaching the check valve to the screw.

15. The apparatus of claim 1 wherein the check valve  
30 comprises:

a body having a protrusion;

a sliding ring having a slot; and  
a valve seat;

such that the first mode occurs when the protrusion moves  
into a bottom of the slot.

5

15. The apparatus according to claim 1 wherein the check  
valve is selected from the group consisting of: a ring-type  
check valve, a poppet-type check valve, and a ball-type check  
valve.

10

16. A method of allowing bi-directional flow in  
reciprocating screw injection molding machines having a barrel  
and screw which rotates in the barrel comprising the steps of:

moving the screw in a rotational direction to allow  
15 material to flow in a first axial direction;

moving the screw in a second axial direction to lock a  
check valve;

moving the screw in the first axial direction to cause the  
material to flow in the second axial direction; and

20 moving the screw in the rotational direction to unlock the  
check valve and allow material to flow in the first axial  
direction.

17. The method according to claim 16 wherein the second,  
25 third, and fourth moving steps are repeated a plurality of  
times.

18. A method of cleaning reciprocating screw injection  
molding machines having a barrel and screw which rotates in the  
30 barrel comprising the steps of:

displacing residual melt in screw flights of the screw with  
a cleaning compound;

accumulating a quantity of the cleaning compound ahead of the screw;

blocking an exit for the cleaning compound from the barrel;

moving the screw in a forward axial motion to cause the  
5 cleaning compound to travel back into the screw flights;

at least partially opening the exit; and

expelling the cleaning compound.

19. The method of claim 18 further comprising, after the  
10 moving step, the step of:

accumulating a quantity of the cleaning compound ahead of the screw.

20. The method of claim 19 wherein the moving and second  
15 accumulating steps are repeated a plurality of times.